

REMARKS

Claims 1- 28 are pending in this application. Claim 6 and 29-31 have been cancelled. Claims 1 – 28 stand rejected pursuant to a non-final Office Action mailed August 18, 2008.

I. Claim Objections - Informalities

Claim 4 stands objected to because of a language informality. The word “diode” has been replaced with the word “photodiode” in claim 4 to correct the informality and to provide proper antecedent basis.

II. Claim Rejections – 35 U.S.C. § 112

Claims 4, 7, 14, 16, 24 and 25 stand rejected for various reasons under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicant regards as the invention. Claims 4, 7, 14, 16, and 24 have been amended to address the Examiner's Section 112 concerns. In particular, the phrase “optionally” has been removed from claims 4 and 7 by the foregoing claim amendment. Similarly, the phrase “preferably” has been removed from claims 14 and 16. Finally, the wave guide of claim 24 has been recited as “a wave guide” to correct the antecedent basis concerns with respect to claims 24 and 25.

III. Claim Rejections – 35 U.S.C. § 102

Claims 1, 5, 6, 13, 19-21, 23, 24 and 26 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Bradley et al. (WO 02/42747). Claims 1, 20 and 21 are independent claims. The remaining claims rejected as anticipated by Bradley depend from either claim 1 or 21. Each of the independent claims 1, 20 and 21 has been amended by the foregoing claim amendment to recite that the detection module comprises a flexible carrier, a sample holder containing an active layer of which an optical property changes when the active layer is in contact with a component to be measured, and the sensor being of the reflective type.

Support for the flexible carrier limitation may be found in the application as filed at page 18, line 3-5 where it is stated, “the sensor can be formed from a flexible carrier material which is provided with OLED photodiode and sample holder.” In addition, at page 12, line

9, further support is provided where it is stated, "during the manufacture, a carrier material based on one of these polymers is flexible in the sense that it can be well shaped into the desired geometry, for instance by folding as illustrated in FIGS. 3D and 3E while it yet has good dimensional stability when the sensor is exposed to heat."

Support for the sensor being of a reflective type may be found throughout the specification, in particular claim 6 as filed and for example, Page 16, line 2 where reflective sensors of FIGS. 3A, 3B, 3E, 3F, and 3G are described.

Support for the limitation that sample holder contains an active layer of which an optical property changes when the active layer is in contact with a component to be measured may be found in original claim 16 and at least page 7 line 25 through page 8 line 20 of the specification.

The Bradley reference relied upon by the Examiner as the basis for the pending anticipation rejection does not teach or suggest the flexible carrier material element, the sample holder with an active layer or that the sensor be of the reflecting type. On the contrary, Bradley teaches a substrate chip 2 which may be formed of a glass or plastic material (page 7, line 24 of the international application as published) which substrate chip defines a channel through which a fluid sample may flow. The Bradley substrate is presumably rigid since substrate flexibility would impede the flow of sample fluid. Furthermore, since the Bradley device relies upon the transmission of light through the substrate and channel between opposing pairs of light emitting diodes and detectors, it is likely that the Bradley device would not operate at all if the substrate were made flexible since the optical alignment between light sources and detectors would be disrupted. It is also clear that Bradley is a transmissive device without any reflective characteristics; see for instance Figure 2 of Bradley. As acknowledged in the office action, Bradley does not disclose a sensor containing an active layer of which an optical property changes when the active layer is in contact with a component to be measured. Since Bradley does not anticipate the active layer, the flexible carrier or the sensor being of the reflective type as recited in all

claims as amended, Applicant respectfully requests that the pending anticipation rejection of claims 1, 5, 6, 13, 19-21, 23, 24, and 26 be withdrawn.

IV. Obviousness Claim Rejections – 35 U.S.C. § 103

Claims 3, 4, 12, 14 and 22 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Bradley et al. in view of Marsoner et al. (U.S. Patent No. 5,039,490). Claims 7-9, 11, and 15 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Bradley et al. in view of Aylott et al. (U.S. Patent No. 6,331,438). Claim 10 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Bradley et al. in view of Aylott et al. and further in view of Carr et al. (U.S. Patent No. 6,045,756). Claims 16-18, 25, and 28 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Bradley et al. in view of Carr et al. Claims 2 and 27 stand rejected 35 U.S.C. § 103(a) over Bradley et al. The Examiner's various obviousness rejections share a common reliance upon Bradley as the primary reference and all obviousness rejections are addressed as a group below.

As described above, each pending independent claim (claims 1, 20 and 21) has been amended to recite flexible carrier material, an active layer and the sensor being of the reflective type. As detailed above, the Bradley et al. reference does not teach or suggest any of these elements. Applicant respectfully submits that the secondary references (Marsoner et al., Aylott et al., and Carr et al.) also do not show a flexible substrate or carrier material. Carr does appear to teach an inflexible, rigid, reflective sensor.

Furthermore, the prior art references cited by the Examiner do not teach or suggest combining a flexible carrier and reflective sensor with the previously recited elements. Applicant suggests that there exists no motivation in the cited art or general knowledge in the field of sensor design which would lead one skilled in the art to provide a sensor with both a flexible substrate and reflective characteristics. On the contrary, reflective sensors such as described in Carr are generally rigid devices which greatly aids in maintaining optical alignment; thus the cited prior art teaches away from the combination of elements recited in the amended claims.

A reflective sensor offers advantages over transmissive type sensors, which advantages are readily apparent in disposable sensor implementations. With a disposable sensor, the sample holder is typically positioned at one side of the carrier/waveguide (for example, on the inner side of a packaging material) and may comprise an active layer that is subject to change as a result of a change in a parameter to be measured. For instance, a sensor as claimed can form part of a plastic packaging material containing a perishable product and be used to detect a parameter of the product e.g., a specific gas formed in or by the product. In the claimed sensor, a part of the packaging material can act as both a waveguide and as a carrier material. Both the LED(s) and the detection photodiode(s) may be positioned at an exterior side of the carrier/waveguide for example, on the outer side of the packaging. This orientation is facilitated by using a reflective layer.

On the contrary, the Bradley system comprises a chamber (such as channel 4) through which fluid for analysis is directed (see page 7, lines 11-18, claim 1). Thus, in order to use Bradley's system one would have to take a sample from what is to be measured (such as the contents of the packaging) and the sample has to be pumped or drawn through the channel. The design of a sensor as claimed allows direct contact of the active layer with whatever is to be measured (such as the contents of a package) without requiring removing a sample and without requiring a pump or the like to introduce the sample into the sensor. Thus, in accordance with the claimed invention a property of the content of a packaging can be measured without having to open the packaging. This novel functionality is greatly facilitated by using a sensor having the claimed flexible carrier and reflective layer.

A sensor constructed upon the same principles could be applied to other applications besides packaging, for example a flexible and reflective sensor could be placed on the skin of a human or animal and be used to detect a parameter (physical or chemical) at the skin surface.

Claim 27 as originally filed suggested a flexible substrate material. Claim 27 stands rejected as obvious in view of Bradley et al. The Examiner states at page 10 of the Office Action,

"Bradley et al. do not teach the carrier materials as one carrier material and the carrier material then folded. It is well known in the art to provide a flexible substrate carrier material such as a flexible printed circuit board (FPCB) which is folded along certain angles and curve points, to provide a simple method of constructing a circuit device with a desired profile and configuration. It would have been obvious to one of ordinary skill in the art at the time the invention was made to provide the carrier materials as one carrier material and the carrier material then folded, in the method of Bradley et al., for improved integration and configurability of the device components, since it has been held that rearranging parts of an invention involves only routine skill in the art. In re Japikse, 86 USPQ 70."

Applicant respectfully submits that the flexible printed circuit board cited by the Examiner as representative of what would be known to one of ordinary skill in the art is in fact not suggestive of the sensor as claimed. In particular, a printed circuit board is clearly an electronic device. According to well-known physical principles, electrons travel within conductive traces and the components of a circuit board regardless of the actual physical configuration of the traces or other conductors. On the contrary, photonic or optical devices such as the claimed sensor rely upon photons traveling through an optically transmissive substrate. Photons will travel in a straight line or be refracted or reflected according to known optical principles. With any optical device, however, the maintenance of a suitable alignment is necessary to assure that photons from a source arrive at a desired detector location. Accordingly, substantial engineering challenges are presented by the development of a flexible and reflective optical detector as claimed. The engineering challenges faced by Applicant are entirely dissimilar from challenges associated with other flexible substrate materials, such as the flexible printed circuit board cited by the Examiner. The difficulty faced with maintaining optical alignment between the OLED and photodiode of applicant's claimed detector in a flexible substrate is quite different from merely rearranging known parts. Accordingly, Applicant respectfully submits that the known flexible circuit boards cited by the Examiner would not motivate one skilled in the art to combine a reflective sensor having a flexible substrate with the other elements claimed by Applicant. Thus, Applicant submits that all claims are not obvious in view of the prior art cited by the Examiner.

For the reasons set forth above, Applicant respectfully submits the claims as filed are allowable over the art of record and reconsideration and issuance of a notice of allowance are respectfully requested. If it would be helpful to obtain favorable consideration of this case, the Examiner is encouraged to call and discuss this case with the undersigned.

This Amendment and Response is filed with a request for a one-month extension of time and an authorization to charge all fees therefore to deposit account No. 19-5117, if not otherwise specifically requested. The undersigned hereby authorizes the charge of any fees created by the filing of this document or any deficiency of fees submitted herewith to deposit account No. 19-5117.

Respectfully submitted,

Date: December 18, 2008

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